WHAT IS CLAIMED IS:

Sub A1 1. A method of detecting voice in a signal, comprising:
estimating a pitch period of the signal;
comparing the estimated pitch period of the signal to at least one threshold; and
detecting voice in the signal as a function of the estimated pitch comparison.

2. The method of claim 1 wherein the signal comprises first, second and third frames, the first frame preceding the second frame in time and the second frame preceding the third frame in time, the method further comprising vacating the voice detection for the second frame if voice is not detected in both the first and third frames.

Sub A2 3. The method of claim 1 further comprising estimating power of the signal, and comparing the estimated power of the signal to at least one power threshold, the detection of voice in the signal being further a function of the estimated power.

4. The method of claim 3 wherein the detection of voice in the signal is based on a minimum estimated power in the range of -45 to -55 dBm.

5. The method of claim 1 wherein the signal pitch period estimation comprises autocorrelating the signal and estimating a pitch period for the autocorrelated signal, the estimated pitch period being a function of the estimated pitch period for the autocorrelated signal.

6. The method of claim 5 wherein the detection of voice in the signal is based on the estimated pitch period of the autocorrelated signal being in the range of 60-400 Hz.

7. The method of claim 6 wherein the voice detection comprises detecting an amplitude of the autocorrelated signal with one period shift and with no shift, the voice detection being further based on the amplitude of autocorrelated signal with one period shift being in the range of 0.25-0.40 of the amplitude of the autocorrelated signal with no shift.

8. The method of claim 6 wherein the voice detection comprises detecting a peak amplitude of the autocorrelated signal with no shift and with a shift, the detection of voice in the signal being further based on the peak amplitude of the shifted autocorrelated signal being less than 0.75 to 0.90 of the peak amplitude of the autocorrelated signal with no shift.

9. A voice detector, comprising:
a pitch tracker to estimate a pitch period of a signal; and

frame based decision logic that compares the estimated pitch period to at least one threshold and detects voice in the signal as a function of the estimated pitch period comparison.

10. The voice detector of claim 9 wherein the signal comprises first, second and third frames, the first frame preceding the second frame in time and the second frame preceding the third frame in time, the voice detector further comprising final decision logic which vacates the detection of voice in the signal for the second frame if voice is not detected by the frame based decision logic for both the first and third frames.

11. The voice detector of claim 9 further comprising autocorrelation logic which autocorrelates the signal, and wherein the pitch tracker estimates the pitch period of the signal by estimating a pitch period for the autocorrelated signal.

12. The voice detector of claim 11 further comprising a power estimator which estimates power of the signal, and wherein the frame based decision logic further compares the estimated power of the signal to at least one power threshold, the detection of voice in the signal being further a function of the power comparison.

13. The voice detector of claim 12 wherein the detection of voice in the signal by the frame based decision logic is based on a minimum estimated power is in the range of -45 to -55 dBm.

14. The voice detector of claim 12 wherein the detection of voice in the signal by the frame based decision logic is based on the estimated pitch period for the autocorrelated signal being in the range of 60-400 Hz.

15. The voice detector of claim 14 wherein the frame based decision logic further detects an amplitude for the autocorrelated signal with one period shift and with no shift, the detection of voice in the signal being further based on the amplitude of the autocorrelated signal with one period being in the range of 0.25-0.40 of the amplitude of the autocorrelated signal with no shift.

16. The voice detector of claim 14 wherein the frame based decision logic further detects a peak amplitude of the autocorrelated signal with no shift and with a shift, the detection of voice in the signal being further based on the peak amplitude of the shifted autocorrelated signal being less than 0.75 to 0.90 of the peak amplitude of the autocorrelated signal with no shift.

17. A transmission system, comprising:
a telephony device which outputs a signal; and
a voice detector having a pitch tracker to estimate a pitch period of the signal, and frame based decision logic that compares the estimated pitch period to at least one threshold and detects voice in the signal as a function of the estimated pitch comparison.

18. The transmission system of claim 17 wherein the signal comprises first, second and third frames, the first frame preceding the second frame in time and the second frame preceding the third frame in time, the voice detector further comprising final decision logic which vacates the detection of voice in the signal for the second frame if voice is not detected by the frame based decision logic for both the first and third frames.

19. The transmission system of claim 17 wherein the voice detector further comprises autocorrelation logic which autocorrelates the signal, and wherein the pitch tracker estimates the pitch period of the signal by estimating a pitch period for the autocorrelated signal.

20. The transmission system of claim 19 wherein the voice detector further comprises a power estimator which estimates power of the signal, and wherein the frame based decision logic further compares the estimated power of the signal to at least one power threshold, the detection of voice in the signal being further a function of the power comparison.

21. The transmission system of claim 20 wherein the detection of voice in the signal by the frame based decision logic is based on a minimum estimated power in the range of -45 to -55 dBm.

22. The transmission system of claim 19 wherein the detection of voice in the signal by the frame based decision logic is based on the estimated pitch period for the autocorrelated signal being in the range of 60-400 Hz.

23. The transmission system of claim 22 wherein the frame based decision logic further detects an amplitude for the autocorrelated signal with one period shift and with no shift, the detection of voice in the signal being further based on the amplitude of the autocorrelated signal with one period being in the range of 0.25-0.40 of the amplitude of the autocorrelated signal with no shift.

24. The transmission system of claim 22 wherein the frame based decision logic further detects a peak amplitude of the autocorrelated signal with no shift and with a shift, the detection of voice in the signal being further based on the peak amplitude of the shifted

autocorrelated signal being less than 0.75 to 0.90 of the peak amplitude of the autocorrelated signal with no shift.

25. The transmission system of claim 17 wherein the telephony device comprises a telephone.

26. The transmission system of claim 17 further comprising a public switched telephone network coupling the telephony device to the voice detector.

27. A system for processing a signal, comprising:

a voice exchange capable of exchanging voice in the signal between a telephony device and a network;

a voiceband data exchange capable of exchanging data in the signal between a data device and the network;

a voice detector having a pitch tracker to estimate a pitch period of the signal, and frame based decision logic that compares the estimated pitch period to at least one threshold and detects voice in the signal as a function of the estimated pitch comparison; and

a resource manager which invokes the voice detector during the voiceband data exchange, the resource manager terminating the voiceband data exchange and invoking the voice exchange when the voice detector detects voice in the signal.

28. The signal processing system of claim 27 wherein the signal comprises first, second and third frames, the first frame preceding the second frame in time and the second frame preceding the third frame in time, the voice detector further comprising final decision logic which vacates the detection of voice in the signal for the second frame if voice is not detected by the frame based decision logic for both the first and third frames.

29. The signal processing system of claim 27 wherein the voice detector further comprises autocorrelation logic which autocorrelates the signal, and wherein the pitch tracker estimates the pitch period of the signal by estimating a pitch period for the autocorrelated signal.

30. The signal processing system of claim 29 wherein the voice detector further comprises a power estimator which estimates power of the signal, and wherein the frame based decision logic further compares the estimated power of the signal to at least one power threshold, the detection of voice in the signal being further a function of the power comparison.

31. The signal processing system of claim 30 wherein the detection of voice in the signal by the frame based decision logic is based on a minimum estimated power is in the range of -45 to -55 dBm.

32. The signal processing system of claim 29 wherein the detection of voice in the signal by the frame based decision logic is based on the estimated pitch period for the autocorrelated signal being in the range of 60-400 Hz.

33. The signal processing system of claim 32 wherein the frame based decision logic further detects an amplitude for the autocorrelated signal with one period shift and with no shift, the detection of voice in the signal being further based on the amplitude of the autocorrelated signal with one period being in the range of 0.25-0.40 of the amplitude of the autocorrelated signal with no shift.

34. The signal processing system of claim 32 wherein the frame based decision logic further detects a peak amplitude of the autocorrelated signal with no shift and with a shift, the detection of voice in the signal being further based on the peak amplitude of the shifted autocorrelated signal being less than 0.75 to 0.90 of the peak amplitude of the autocorrelated signal with no shift.

35. A method of processing a signal, comprising:

invoking a data exchange service to exchange data in the signal between a data device and a network;

invoking a voice detection service comprising estimating a pitch period of the signal, comparing the estimated pitch period of the signal to at least one threshold, and detecting voice in the signal as a function of the estimated pitch comparison; and

terminating the data exchange service and invoking a voice exchange service when the voice detector detects voice in the signal.

36. The method of claim 35 wherein the signal comprises first, second and third frames, the first frame preceding the second frame in time and the second frame preceding the third frame in time, the voice detector further comprising vacating the detection of voice in the signal for the second frame if voice is not detected by the frame based decision logic for both the first and third frames.

37. The method of claim 35 wherein the invoked voice detection service further comprises estimating power of the signal, and comparing the estimated power of the signal to at

least one power threshold, the detection of voice in the signal being further a function of the estimated power.

38. The method of claim 36 wherein the detection of voice in the signal is based on a minimum estimated power in the range of -45 to -55 dBm.

39. The method of claim 35 wherein the signal pitch period estimation comprises autocorrelating the signal and estimating a pitch period for the autocorrelated signal, the estimated pitch period of the signal being a function of the estimated pitch period for the autocorrelated signal.

40. The method of claim 39 wherein the detection of voice in the signal is based on an autocorrelation pitch period in the range of 60-400 Hz.

Sub A10 41. The method of claim 40 wherein the invoked voice detection service further comprises detecting an amplitude of the autocorrelated signal with one period shift and with no shift, the detection of voice in the signal being further based on the amplitude of autocorrelated signal with one period shift being in the range of 0.25-0.40 of the amplitude of the autocorrelated signal with no shift.

42. The method of claim 40 wherein the invoked voice detection service comprises detecting a peak amplitude of the autocorrelated signal with no shift and with a shift, the detection of voice in the signal being further based on the peak amplitude of the shifted autocorrelated signal being less than 0.75to 0.90 of the peak amplitude of the autocorrelated signal with no shift.

43. Computer-readable media embodying a program of instructions executable by a computer to perform a method of detecting voice in a signal, the method comprising:

estimating a pitch period of the signal;

comparing the estimated pitch period of the signal to at least one threshold; and

detecting voice in the signal as a function of the estimated pitch comparison.

44. The computer-readable media of claim 43 wherein the signal comprises first, second and third frames, the first frame preceding the second frame in time and the second frame preceding the third frame in time, the method further comprising vacating the voice detection for the second frame if voice is not detected in both the first and third frames.

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45. The computer-readable media of claim 43 wherein the method further comprises estimating power of the signal, and comparing the estimated power of the signal to at least one power threshold, the detection of voice in the signal being further a function of the estimated power.

46. The computer-readable media of claim 35 wherein the detection of voice in the signal is based on a minimum estimated power in the range of -45 to -55 dBm.

47. The computer-readable media of claim 43 wherein the signal pitch period estimation comprises autocorrelating the signal and estimating a pitch period for the autocorrelated signal, the estimated pitch period being a function of the estimated pitch period for the autocorrelated signal.

48. The computer-readable media of claim 47 wherein the detection of voice in the signal is based on the estimated pitch period of the autocorrelated signal being in the range of 60-400 Hz.

49. The computer-readable media of claim 48 wherein the voice detection comprises detecting an amplitude of the autocorrelated signal with one period shift and with no shift, the voice detection being further based on the amplitude of autocorrelated signal with one period shift being in the range of 0.25-0.40 of the amplitude of the autocorrelated signal with no shift.

50. The computer-readable media of claim 48 wherein the voice detection comprises detecting a peak amplitude of the autocorrelated signal with no shift and with a shift, the detection of voice in the signal being further based on the peak amplitude of the shifted autocorrelated signal being less than 0.75 to 0.90 of the peak amplitude of the autocorrelated signal with no shift.

51. A voice detector, comprising:

pitch estimation means for estimating a pitch period of a signal;

comparison means for comparing the estimated pitch period to at least one threshold; and

voice detection means for detecting voice in the signal as a function of the estimated pitch period comparison.

52. The voice detector of claim 51 wherein the signal comprises first, second and third frames, the first frame preceding the second frame in time and the second frame preceding the third frame in time, the voice detector further comprising means for vacating the detection

of voice in the signal for the second frame if the voice detection means does not detect voice for both the first and third frames.

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53. The voice detector of claim 51 further comprising means for autocorrelating the signal, and wherein the pitch estimation means estimates the pitch period of the signal by estimating a pitch period for the autocorrelated signal.

54. The voice detector of claim 53 further comprising power estimation means for estimating power of the signal, and means for comparing the estimated power of the signal to at least one power threshold, wherein the voice detection means is further adapted to detect voice in the signal as a function of the power comparison.

55. The voice detector of claim 54 wherein the detection of voice in the signal by the voice detection means is based on a minimum estimated power is in the range of -45 to -55 dBm.

56. The voice detector of claim 53 wherein the detection of voice in the signal by the voice detection means is based on the estimated pitch period for the autocorrelated signal being in the range of 60-400 Hz.

57. The voice detector of claim 56 further comprising amplitude detection means for detecting an amplitude for the autocorrelated signal with one period shift and with no shift, the detection of voice in the signal by the voice detecting means being further based on the amplitude of the autocorrelated signal with one period being in the range of 0.25-0.40 of the amplitude of the autocorrelated signal with no shift.

58. The voice detector of claim 56 further comprising amplitude detection means for detecting a peak amplitude of the autocorrelated signal with no shift and with a shift, the detection of voice in the signal by the voice detection means being further based on the peak amplitude of the shifted autocorrelated signal being less than 0.75 to 0.90 of the peak amplitude of the autocorrelated signal with no shift.

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59. A transmission system, comprising:

a telephony device which outputs a signal; and

a voice detector having means for pitch estimation means for estimating a pitch period of the signal, comparison means for comparing the estimated pitch period to at least one threshold, and voice detection means for detecting voice in the signal as a function of the estimated pitch comparison.

60. The transmission system of claim 59 wherein the signal comprises first, second and third frames, the first frame preceding the second frame in time and the second frame preceding the third frame in time, the voice detector further comprising means for vacating the detection of voice in the signal for the second frame if voice is not detected by the voice detection means for both the first and third frames.

Sub A14 61. The transmission system of claim 59 wherein the voice detector further comprises means for autocorrelating the signal, and wherein the pitch estimation means estimates the pitch period of the signal by estimating a pitch period for the autocorrelated signal.

62. The transmission system of claim 61 wherein the voice detector further comprises power estimation means for estimating power of the signal, and means for comparing the estimated power of the signal to at least one power threshold, wherein the detection means is further adapted to detect voice in the signal as a function of the power comparison.

Sub A15 63. The transmission system of claim 62 wherein the detection of voice in the signal by the voice detection means is based on a minimum estimated power in the range of -45 to -55 dBm.

64. The transmission system of claim 61 wherein the detection of voice in the signal by the voice detection means is based on the estimated pitch period for the autocorrelated signal being in the range of 60-400 Hz.

65. The transmission system of claim 64 further comprising amplitude detection means for detecting an amplitude for the autocorrelated signal with one period shift and with no shift, the detection of voice in the signal by the voice detection means being further based on the amplitude of the autocorrelated signal with one period being in the range of 0.25-0.40 of the amplitude of the autocorrelated signal with no shift.

66. The transmission system of claim 64 further comprising amplitude detection means for detecting a peak amplitude of the autocorrelated signal with no shift and with a shift, the detection of voice in the signal by the voice detection means being further based on the peak amplitude of the shifted autocorrelated signal being less than 0.75 to 0.90 of the peak amplitude of the autocorrelated signal with no shift.

67. The transmission system of claim 59 wherein the telephony device comprises a telephone.

68. The transmission system of claim 59 further comprising a public switched telephone network coupling the telephony device to the voice detector.

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69. A system for processing a signal, comprising:

voice means for exchanging voice in the signal between a telephony device and a network;

data means for exchanging data in the signal between a data device and the network;

voice detector having pitch estimation means for estimating a pitch period of the signal, comparison means for comparing the estimated pitch period to at least one threshold, and voice detection means for detecting voice in the signal as a function of the estimated pitch comparison; and

invoking means for invoking the voice detector during the data exchange, the invoking means terminating the data exchange and invoking the voice exchange when the voice detector detects voice in the signal.

70. The signal processing system of claim 69 wherein the signal comprises first, second and third frames, the first frame preceding the second frame in time and the second frame preceding the third frame in time, the voice detector further comprising means for vacating the detection of voice in the signal for the second frame if the voice detection means does not detect voice for both the first and third frames.

71. The signal processing system of claim 69 wherein the voice detector further comprises means for autocorrelating the signal, and wherein the pitch estimation means estimates the pitch period of the signal by estimating a pitch period for the autocorrelated signal.

72. The signal processing system of claim 69 wherein the voice detector further comprises power estimation means for estimating power of the signal, means for comparing the estimated power of the signal to at least one power threshold, wherein the detection means is further adapted to detect voice as a function of the power comparison.

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73. The signal processing system of claim 72 wherein the detection of voice in the signal by the voice detection means is based on a minimum estimated power is in the range of -45 to -55 dBm.

74. The signal processing system of claim 71 wherein the detection of voice in the signal by the voice detection means is based on the estimated pitch period for the autocorrelated signal being in the range of 60-400 Hz.

75. The signal processing system of claim 74 further comprising amplitude detection means for detecting an amplitude for the autocorrelated signal with one period shift and with no shift, the detection of voice in the signal by the voice detection means being further based on the amplitude of the autocorrelated signal with one period being in the range of 0.25-0.40 of the amplitude of the autocorrelated signal with no shift.

76. The signal processing system of claim 74 further comprising amplitude detection means for detecting a peak amplitude of the autocorrelated signal with no shift and with a shift, the detection of voice in the signal by the detection means being further based on the peak amplitude of the shifted autocorrelated signal being less than 0.75 to 0.90 of the peak amplitude of the autocorrelated signal with no shift.

Sub A18 77. Computer-readable media embodying a program of instructions executable by a computer to perform a method of processing a signal, the method comprising:

invoking a data exchange service to exchange data in the signal between a data device and a network;

invoking a voice detection service comprising estimating a pitch period of the signal, comparing the estimated pitch period of the signal to at least one threshold, and detecting voice in the signal as a function of the estimated pitch comparison; and

terminating the data exchange service and invoking a voice exchange service when the voice detector detects voice in the signal.

78. The computer-readable media of claim 77 wherein the signal comprises first, second and third frames, the first frame preceding the second frame in time and the second frame preceding the third frame in time, the voice detector further comprising vacating the detection of voice in the signal for the second frame if voice is not detected by the frame based decision logic for both the first and third frames.

79. The computer-readable media of claim 77 wherein the invoked voice detection service further comprises estimating power of the signal, and comparing the estimated power of the signal to at least one power threshold, the detection of voice in the signal being further a function of the estimated power.

80. The computer-readable media of claim 79 wherein the detection of voice in the signal is based on a minimum estimated power in the range of -45 to -55 dBm.

81. The computer-readable media of claim 77 wherein the signal pitch period estimation comprises autocorrelating the signal and estimating a pitch period for the

autocorrelated signal, the estimated pitch period of the signal being a function of the estimated pitch period for the autocorrelated signal.

82. The computer-readable media of claim 81 wherein the detection of voice in the signal is based on an autocorrelation pitch period in the range of 60-400 Hz.

83. The computer-readable media of claim 82 wherein the invoked voice detection service further comprises detecting an amplitude of the autocorrelated signal with one period shift and with no shift, the detection of voice in the signal being further based on the amplitude of autocorrelated signal with one period shift being in the range of 0.25-0.40 of the amplitude of the autocorrelated signal with no shift.

84. The computer-readable media of claim 82 wherein the invoked voice detection service comprises detecting a peak amplitude of the autocorrelated signal with no shift and with a shift, the detection of voice in the signal being further based on the peak amplitude of the shifted autocorrelated signal being less than 0.75to 0.90 of the peak amplitude of the autocorrelated signal with no shift.

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